California Environmental Protection Agency
Air Resources Board

INNOVATIVE CLEAN AIR TECHNOLOGIES

UPDATE

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ICAT PROJECTS FEATURED IN THIS ISSUE:

WELCOME TO THE INNOVATIVE CLEAN AIR TECHNOLOGIES (ICAT) PROGRAM UPDATE

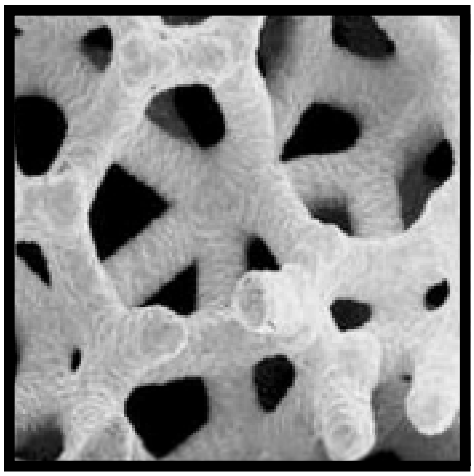
This is the premier issue of *UPDATE*, ICAT's new semi-annual newsletter, designed to keep you informed of current news and events, advise you of existing and upcoming agreements, and share successes. We hope it will help answer your questions, expand your awareness of the ICAT program, and encourage you to share the information with others. If you know anyone who might like to be added to our mailing list, please contact us at the address on the back of this newsletter or visit our new Internet website at www.arb.ca.gov/research/icat/icat.htm.

ICAT Contractor Recipient of DOE's (NICE^3) Award

AVES, Inc., who assisted Adhesive Coatings Company (ADCO) in developing a zero-VOC (volatile organic compound) industrial coating technology for the ICAT program (see inside article), has been selected as one of ten recipients of the prestigious 1998 National Industrial Competitiveness through Energy, Environment, and Economics (NICE^3) award from the U.S. Department of Energy (DOE). AVES, Inc. will receive a $275,000 grant from the DOE NICE^3 Program to support continued deployment of this innovative technology.

Congratulations to AVES, Inc. on their outstanding accomplishments and well-deserved award!

The ICAT Crew (left to right): Manjit Ahuja, Dr. John Holmes, Tony Andreoni, Joann Myhre, Ralph Propper, Dr. Robert Barham. Not pictured: Hector Maldonado, Jim Moncrieff, Annmarie Mora, and Emma Plasencia.



Microscopic view of Ultramet's open-cell foam.

Ultramet's Catalyst Achieves Ultra-Low Emission Vehicle (ULEV) Standards

Ultramet, a small southern California company specializing in advanced materials technology, recently completed work on an ICAT project to develop their UltraCat catalyst technology for automotive and small aircraft applications.

The UltraCat offers a rugged, compact emissions reduction device that features fast catalyst lightoff, excellent high temperature resistance, and high heat and mass-transfer characteristics. As part of the ICAT project, Ultramet developed methods to coat UltraCat substrates with catalyst materials. The UltraCat catalyst uses open cell, silicon carbide foam catalyst substrates in gasoline-fueled engines. The three-dimensional lattice of UltraCat's interconnected cells allows for a much more rapid absorption of heat from exhaust gases, thereby reducing emissions more effectively. In addition, smaller and more durable catalytic converters can be built using this design technology.

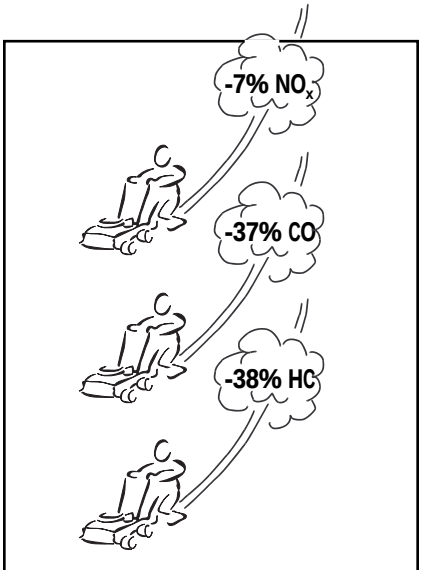
Tests of an UltraCat catalytic converter that was installed in a Honda Accord met and exceeded ARB's ULEV standards. Tests of the converter on a piston engine from a general aviation aircraft resulted in emission reductions of 40% to 90% for hydrocarbons, carbon monoxide, and oxides of nitrogen.

If you would like additional information about Ultramet or this project, please contact Mr. Edwin Stankiewicz at (818) 899-0236 or visit their website at www.ultramet.com.

Electronically-Controlled 2-Stroke Engine Boosts Power, Cuts Pollution

BKM, Inc., a small engineering company in San Diego, California, recently completed a project sponsored, in part, by ICAT "seed" funding. BKM formed a consortium with small engine manufacturers to develop an electronically controlled, two-stroke, handheld utility engine. A 46-cubic centimeter Tanaka engine served as the base engine for the BKM fuel injection system. This design does not require a battery (i.e., it uses a magneto) and features an improved engine oiling system.

Recent tests of the BKM system produced emission reductions of approximately 38% for hydrocarbons (HC), 37% for carbon monoxide (CO), and 7% for oxides of nitrogen (NO_x), when compared to ARB's recently adopted Tier II emissions standards for handheld utility engines. In addition to these impressive emissions results, the engine's rated power was increased from 1.8 hp to 1.92 hp (approximately 7%). A slightly richer calibration was also tested that still met Tier II standards, but increased rated power by nearly 12%! In addition to lowering emissions, this design is also expected to produce significant reductions in fuel consumption.



BKM 2-STROKE ENGINE EMISSIONS REDUCTIONS

The BKM fuel injection design has widespread potential two-stroke applications, ranging from handheld utility engines to the engines for mopeds, small motorcycles, and personal watercraft. BKM is currently seeking partners to help in the commercialization of their design ...an Innovative Clean Air Technology that supports ARB policy goals, reduces exhaust emissions, and has excellent commercial potential.

For more information please contact Mr. Bill Johnson of BKM at (619) 270-6760.

NO_X Removal Process From CHA Offers Long-Term Solution for Industry

The CHA Corporation recently completed their ICAT project, a prototype demonstration of their NO_x removal system for the treatment of stationary diesel exhaust. This brings their system one step closer to full commercialization and will ultimately offer industry a flexible, long-term solution for reducing NO_x emissions.

> THE ABSENCE OF ANY MEASURABLE NO_X IN THE OUTLET GAS CONFIRMED THE DEMONSTRATION'S COMPLETE SUCCESS.

The CHA design is an integrated, continuous adsorption/regeneration system capable of removing 99% of NO_x, as well as destroying the volatile organic compounds (VOCs) and soot present in diesel exhaust. The exhaust is first sent through a particle filter to remove the soot and then through a heat exchanger to reduce the gas temperature. From there, pollutants are removed from the flue gases by passing them through a bed of relatively inexpensive carbon adsorbent. The trapped pollutants are then destroyed during regeneration of the carbon by exposure to microwave energy. This process decomposes NO_x to nitrogen and carbon dioxide (CO_2), VOCs to CO_2 and water, and sulfur oxides (SO_x) to elemental sulfur and CO_2.

In March 1998, the prototype unit underwent a weeklong demonstration at McClellan Air Force Base in Sacramento. No mechanical or technical problems were encountered, despite frequent start-up and shut-down operations. The absence of any measurable NO_x in the outlet gas confirmed the demonstration's complete success.

Initially, to target several specific markets, CHA plans to continue demonstrating the viability of their technology for small-scale applications. As they scale up the process, they will be able to demonstrate and apply it to the needs of larger industries.

For more information please contact Mr. Charlie Carlisle of CHA Corporation at (307) 742-2829.

AVES and ADCO Set New Low-VOC Benchmark for Industrial Coatings Industry

The evaporation of solvents used in paints represents an important source of volatile organic compound (VOC) emissions. By phasing in low-VOC and zero-VOC coatings, industries would be able to reduce air emissions and costs without the installation of add-on controls.

With ICAT funding, AVES, Inc. and ADCO developed and demonstrated a metal coating system that contains zero VOCs and no hazardous air pollutants. The two-part coating system, consisting of an epoxy resin emulsion and an aqueous solution of polyamine reaction products, was first tested in the laboratory with extremely promising results. Field demonstrations were then conducted at two recreational vehicle manufacturing facilities. Results from these demonstrations provided the data for the performance, cost analysis, and environmental study reports necessary to a successful commercial rollout. National recognition of this achievement came in the form of the 1998 NICE^3 award from the U.S. Department of Energy (see cover story). ADCO has signed a licensing agreement with Sierra Performance Coatings, Inc. and has recently received its first order from National RV. Substantial progress has been made identifying additional market opportunities for this zero-VOC coating system in both the U.S. and global paint and coating markets. The development of a cost-effective process for reducing VOC emissions, along with the associated environmental benefits, will help California meet its clean air goals while stimulating the economy and offering new opportunities to associated industries.

If you would like additional information on this ICAT project, please contact Mr. Jim Shannon of ADCO at (650) 571-7947.

Air Resources Board

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ICAT

INNOVATIVE CLEAN AIR TECHNOLOGIES

ON THE WEB
www.arb.ca.gov / research / icat / icat.htm

INNOVATIVE CLEAN AIR TECHNOLOGIES (ICAT) PROGRAM OFFERS OPPORTUNITIES FOR SUCCESS!

Since 1994, the Innovative Clean Air Technologies (ICAT) Program has provided over $2.5 million in co-funding for eleven projects designed to develop and demonstrate technologies for reducing air pollution. The ICAT program is currently allocating approximately $1 million annually to help fund projects for developing technologies that support the Air Resources Board's (ARB) clean air objectives and have the potential to create California jobs. To be eligible for ICAT funding, your project must:

- Be technically feasible
- Reduce air pollution
- Have good market potential
- Have the potential to create jobs in California
- Meet administrative requirements (i.e., provide matching funds; comply with disabled veteran guidelines)

If your project is past the research, development and proof of concept stages, ICAT can help you through the crucial pilot, prototype, and/or application demonstration stages of your innovative technology. From there, your next and final step is the commercial sale of your product.

You win and California wins! For additional information, call (916) 323-1067 or see our web site.